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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WHITTINGTON, KENNETH	

ART UNIT	PAPER NUMBER
2862	

DATE MAILED: 12/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H·A

Office Action Summary	Application No.	Applicant(s)	
	10/644,786	MACPHAIL ET AL.	
	Examiner	Art Unit	
	Kenneth J. Whittington	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Bot Ledynh
Primary Examiner

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The Amendment filed November 4, 2005 has been entered and reviewed. In view thereof, the objections to the specification and drawings have been withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding these claims, they recite the feature that the integrated circuit is "absent a series resistor". At most, the specification and drawings illustrate there is no resistor in the sensor section that is directly connected to the sensor coil as shown in FIG. 4 (in comparison to FIGS. 1 and 2). However,

the recitation that "the integrated circuit … absent a series resistor" is not described or enabled in any manner.

Initially, it is noted that Applicant has not specifically provided the integrated circuit diagrams for the claimed invention other than the simple box diagram shown in FIG. 5 of the present application.

Furthermore, it is well known in the art that circuitry components in association require series resistors to cut current and voltage at various stages of each component. For example, note the circuit diagrams showing resistors as integral components of the drivers, differentiators, amplifiers comparators, etc. of shown in US6,427,349, US6,346,892, US5,124,648 and US4,300,095 as well as those portions of Vernon et al. (US6,268,725) and Kurihara et al. (US5,757,184) showing resistors as part of the circuitry. Therefore, as specifically disclosed and well known in the art, resistors are an integral part of each of the circuitry components associated with a magnetometer coil.

Applicant has not shown how the integrated circuit of the claimed invention in association with a magnetometer coil can be devoid of series resistors. While such a feature would be a distinct feature over the applied prior art, Applicant has not

provided any basis on how one having ordinary skill in the art would make such circuits without undue experimentation.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 9-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurihara et al. (US 5,757,184). Regarding claim 9, Kurihara et al. discloses a method for determining a magnetic field comprising:

using an integrated circuit to provide a current signal to a coil via a pair of contacts (See circuit shown in Kurihara et al. FIG. 10, note also two contacts to coil shown in FIG. 5 and see col. 6, lines 10-11), the coil comprising a core (See FIG. 5, item 1);

monitoring a voltage potential between the pair of contacts (See circuit shown in FIG. 10);

determining a duty cycle associated with a first electromagnetic saturation of the core, and a second electromagnetic saturation of the core, the second electromagnetic saturation of the core having an opposite polarity to the first electromagnetic saturation (See FIGS. 5-9 and col. 6, line 56 to col. 9, line 2); and

determining a direction based upon characteristics of the current signal, and the duty cycle (See col. 8, line 66 to col. 9, line 2 and col. 1, lines 15-19).

Regarding claim 10, the integrated circuit provides a triangular output signal (See col. 9, lines 32-41).

Regarding claims 11 and 12, the integrated circuit monitors the voltage potential (See FIGS. 5-9 and col. 6, line 56 to col. 9, line 2).

Claims 13, 14 and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Vernon et al. (US 6,268,725).

Regarding claim 13, Vernon et al. discloses an apparatus and method for a magnetic field measuring device comprising:

a coil comprising a core and a pair of contacts (See Vernon et al. col. 4, lines 24-28 and note illustrative embodiment in FIG. 4, particularly the two contacts, one above and one to ground), the core for alternating between a first magnetically saturated state and a second magnetically saturated state in response to a differential periodic time-varying current signal applied to the contacts and an external magnetic field, the second magnetically saturated state having an opposite polarity to the first magnetically saturated state (See col. 4, line 1 to col. 5, line 60); and

an integrated circuit comprising two contacts and disposed on a substrate (See circuitry shown in FIGS. 1-4 associated with the sensor and see col. 4, lines 37-40 and col. 2, line 59 to col. 3, line 19), the contacts of the integrated circuit electrically coupled to the contacts of the coil, the two contacts of the integrated circuit both for providing the differential periodic time-varying current signal and for receiving a time-varying voltage signal (See same portions of Vernon et al.), the time-varying voltage signal having a duty cycle dependant upon an orientation of the coil relative to the external magnetic field (See col. 6, lines 28-31).

Regarding claims 14 and 16, Vernon et al. discloses the time-varying current signal is a triangular wave current signal generated using a triangular wave generator (See FIGS. 1-4 and col. 4, lines 51-65, note drive signal generator forming triangular waveforms).

Regarding claims 17 and 18, Vernon et al. discloses that the sensor portion may be located on the chip with the other circuitry of the magnetometer or it may be located off chip from the circuitry (See col. 4, lines 37-41).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 13, 14, 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al. in view of Vernon et al.

Regarding claims 13, 17 and 18, Kurihara et al. discloses a geomagnetism sensor comprising:

a coil comprising a core and a pair of contacts (See Kurihara et al. FIG. 5, note two contacts to coil shown and core), the core for alternating between a first magnetically saturated state and a second magnetically saturated state in response to a differential periodic time-varying current signal applied to the contacts and an external magnetic field, the second magnetically saturated state having an opposite polarity to the first magnetically saturated state (See FIGS. 5-9 and col. 6, line 56 to col. 9, line 2); and

an integrated circuit comprising two contacts (See circuitry shown in FIG. 10 associated with the sensor and see col. 9, line 6 to col. 11, line 23), the contacts of the integrated circuit electrically coupled to the contacts of the coil, the two contacts of the integrated circuit both for providing the differential periodic time-varying current signal and for receiving a time-varying voltage signal (See FIG. 10,

note connection and see same paragraphs), the time-varying voltage signal having a duty cycle dependant upon an orientation of the coil relative to the external magnetic field (See col. 8, line 66 to col. 9, line 2 and col. 1, lines 15-19).

However, Kurihara et al. does not explicitly teach the arrangement of the magnetometer with regard to a substrate. Vernon et al. teaches that magnetometers can be arranged on a chip such that either the sensor portion including the coil and core are located either on the same chip or located off chip on a separate substrate (See Vernon et al. col. 4, lines 37-41). It would have been obvious at the time the invention was made to incorporate the circuitry onto a chip (substrate) and to either have the sensor portion on the same chip or another chip from the circuitry. One having ordinary skill in the art would have been motivated to place the components on a substrate or chip to provide a stable platform onto which to assemble and connect the various circuit components and further one having ordinary skill in the art would motivated to either place the sensor on a separate substrate or the same substrate as the other circuitry because such arrangements are art recognized equivalents for measuring magnetic fields as recognized by Vernon et al. (see same paragraphs).

Regarding claims 14 and 16, Kurihara et al. discloses the time-varying current signal is a triangular wave current signal generated using a triangular wave generator (See Kurihara et al. col. 9, lines 32-41).

Regarding claim 19, Kurihara et al. teaches a second coil, the second coil comprising a second core and a second pair of contacts (See Kurihara et al. FIG. 19, item 41y), the second core for alternating between a third magnetically saturated state and a fourth magnetically saturated state in response to a time-varying current signal applied to the second pair of contacts and the external magnetic field, the fourth magnetically saturated state having an opposite polarity to the third magnetically saturated state, the second coil disposed at a substantially non-zero angle relative to the first coil (See col. 14, line 11 to col. 18, line 60).

Regarding claim 20, Kurihara et al. teaches a third coil, the third coil comprising a third core and a third pair of contacts (See Kurihara et al. FIG. 19, item 41z), the third core for alternating between a fifth magnetically saturated state and a sixth magnetically saturated state in response to a time-varying current signal applied to the third pair of contacts and the external magnetic field, the sixth magnetically saturated state having an opposite polarity to the fifth magnetically

saturated state, the third coil disposed at a substantially non-zero angle relative to both the first coil and the second coil (See col. 14, line 11 to col. 18, line 60).

Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al. in view of Vernon et al. as applied to claim 13 above, and further in view of Kawahito et al. (A 2-D CMOS Microfluxgate Sensor System for Digital Detection of Weak Magnetic fields). Kurihara et al. in view of Vernon et al. teaches the features of claims 1 and 13 as discussed above. Further, this combination teaches using a triangular wave generator (See Kurihara et al. col. 9, lines 32-41). However, this combination does not teach a square wave to triangular wave converter. Kawahito et al. teaches applying a triangular wave form to a coil in a fluxgate sensor using a square to triangular wave generator (See FIG. 8 on page 1847). It would have been obvious to use the square to triangular wave converter as the triangular wave generator in the noted combination. One having ordinary skill in the art would have been motivated to do so to create a consistent triangular signal wave-form based on a digital clock signal (See Kawahito et al. page 1848).

Response to Arguments

Applicant's arguments filed November 4, 2005 have been fully considered but they are not persuasive. The arguments with regard to claims 1-8 are moot in view of the new grounds for rejection noted above.

Regarding Applicant's assertion that Vernon et al. does not disclose a differential periodic signal, it is noted that Applicant has not provided any definition of what a differential periodic signal. The only basis for this feature is at paragraph 0019 and 0022 of the specification, which states the signal has a cyclical behavior and is triangular. Both Vernon et al. and Kurihara et al. disclose such features as noted above.

Regarding Applicant assertion that Kurihara et al. does not disclose "monitoring a voltage potential between the pair of contacts" as recited in claim 9, it is initially noted that the entire purpose of all of the circuitry shown in FIG. 10 of Kurihara is for the monitoring of the voltage between the contacts on each side of the coil 11, this is the entire purpose of the invention as well as that of any other magnetometer using a coil. The voltage across the coil in Kurihara et al. is monitored, processed and compared with a reference voltage to determine the magnetic field present (See FIG. 10 and the

associated disclosure therefor). Accordingly, Kurihara et al. discloses the features of claims 9-12.

Furthermore, Applicant has not provided and disclosure of the specific circuitry of the claimed invention other than the coil illustration of FIG. 4 and the simple box diagram of FIG. 5. It is unclear how Applicant can distinguish the electronic circuitry of the claimed invention without providing any circuitry basis for comparison.

Regarding Applicant's comments that there is no motivation to apply the teachings of Vernon et al. to the disclosure of Kurihara et al. because Vernon et al. involves a pseudo-random drive, it is noted that Applicant has ignored or misunderstood the recited basis for the rejection. Vernon et al. is being applied for its teaching of the arrangement of the magnetometer with regard to a substrate or the integrated circuit, not for the teachings asserted by Applicant.

For the forgoing reasons, the rejections stand.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The newly cited references teach the use of resistors in circuitry associated with a magnetometer coil.

Conclusion

Applicant's amendment necessitated the new/amended grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kenneth J Whittington
Examiner
Art Unit 2862

kjw